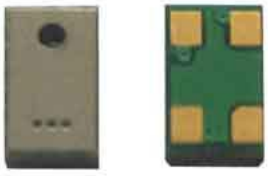
Microphone Test System

Mobile Phone Microphones

The NTi Audio microphone test system is a comprehensive test solution with short test cycle times. The turnkey system is based on the high-speed FX100 Audio Analyzer and the dedicated production test software "RT-Microphone". It provides a comprehensive set of measurements for the total quality control of microphone components or final assembled products, such as mobile phones, vocal microphones or headsets.

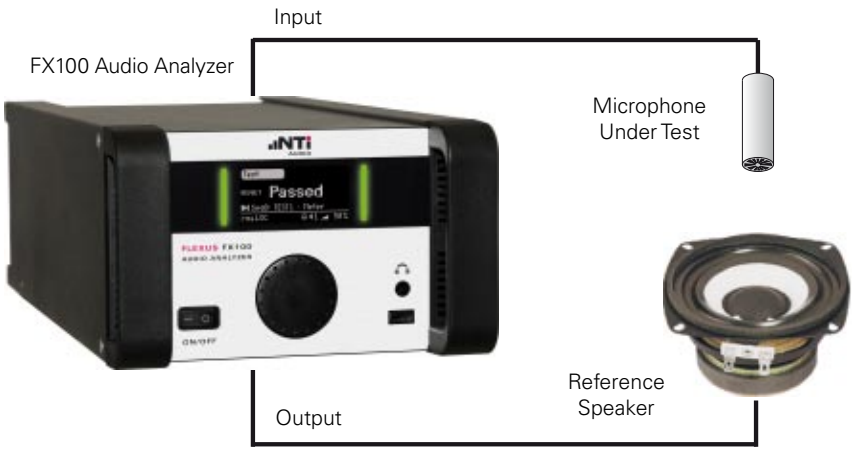


MEMS Microphones

Key-Parameters:

- Accurate and repeatable measurements
- Turnkey Solution with flexible user interface
- Short test cycle time, typically < 2 seconds
- Dedicated for R&D and automated production lines
- Scalable test architecture with dual channel measurements and optional switchers for sequential testing of one or more microphones
- Built in phantom power supply

Vocal Microphones



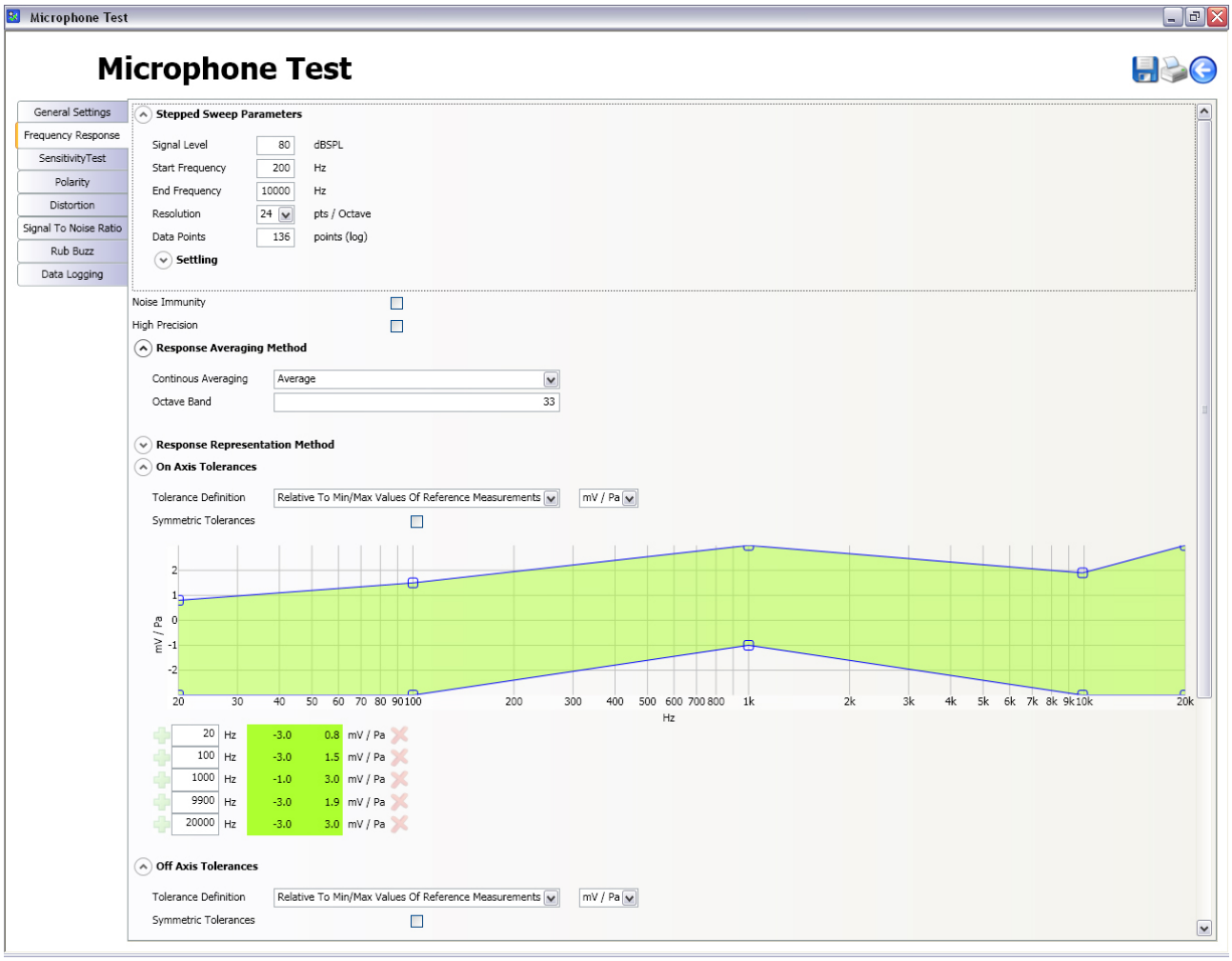
Microphone Test Configuration

Flexible Parameter and Tolerance Setting

Microphones naturally bear an error rate in production. Sorting out faulty devices in an early production stage is important, thus this increases the overall yield, reduces waste material and optimizes the quality of the manufactured goods. Important for a modern, state-of-the-art microphone test system are reproducibility, automation, speed and simplicity. The FX100 Audio Analyzer forms the microphone test system comprising exactly these features.

Measurement Functions:

- Frequency response in-axis, off-axis
- Sensitivity
- Distortion
- Signal-to-noise ratio S/N
- Detection of audible imperfections
- Directivity, polar plot and polarity

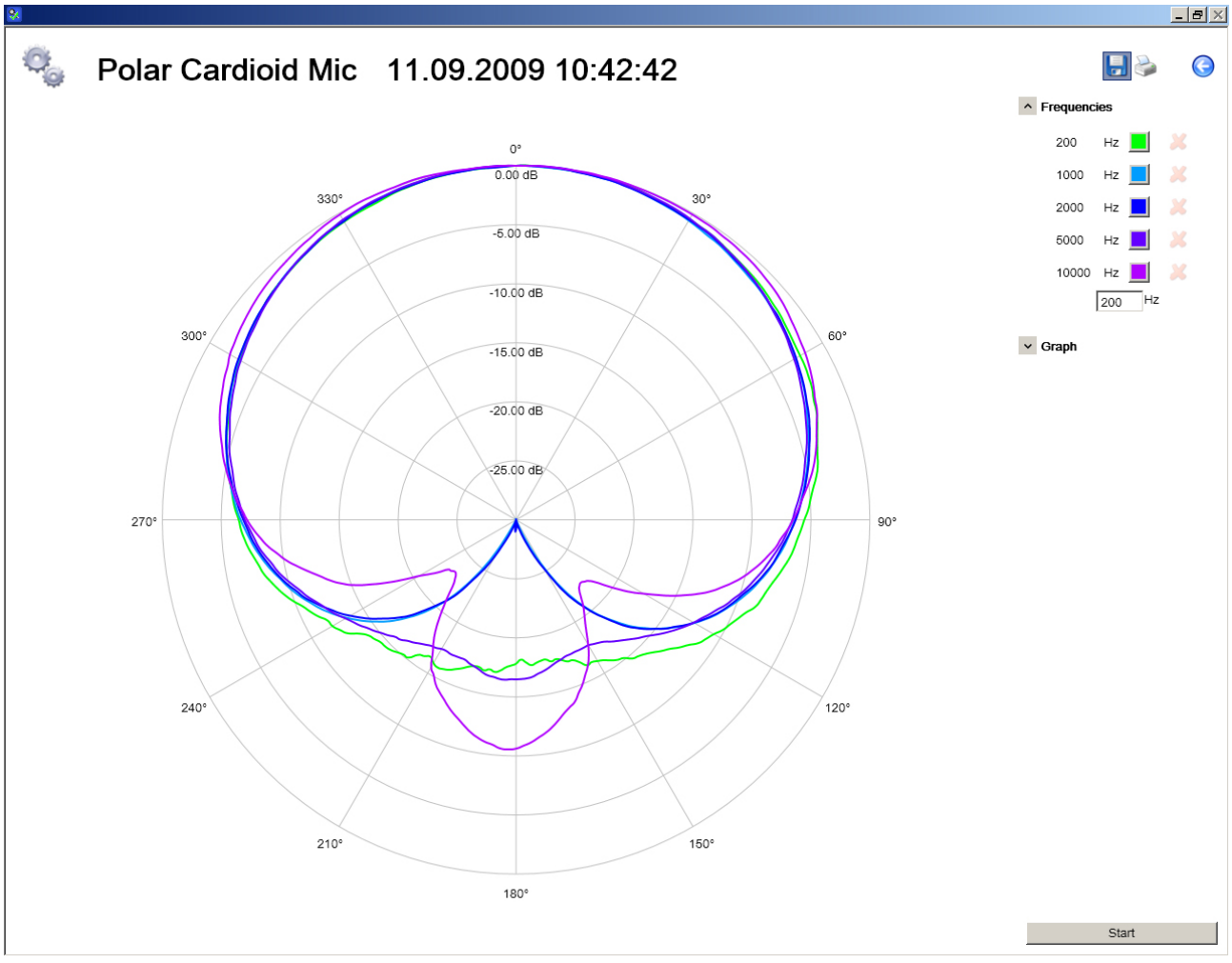


Screenshot: Test parameter and tolerance setting

High-Resolution Polar Plot Measurement

The polar plot analysis with the NTi Audio precision turntable complements the microphone measurement system to an all-in-one solution. The polar diagram displays the directional characteristic related to the measurement frequency of the microphone. For detailed analysis, the measurement angles might be set in arbitrary resolution down to less than 1°.

The high-speed FX100 Audio Analyzer generates a series of fast sweep signals, covering the complete audio band from 20 Hz – 20 kHz, and turns the microphone to the configured angles between the sweeps. The measurement time halves by choosing the 180° mode, which mirrors the polar image. The polar plot graphics can be adjusted after the completed measurement, thus the microphone test system offers full flexibility for post processing.

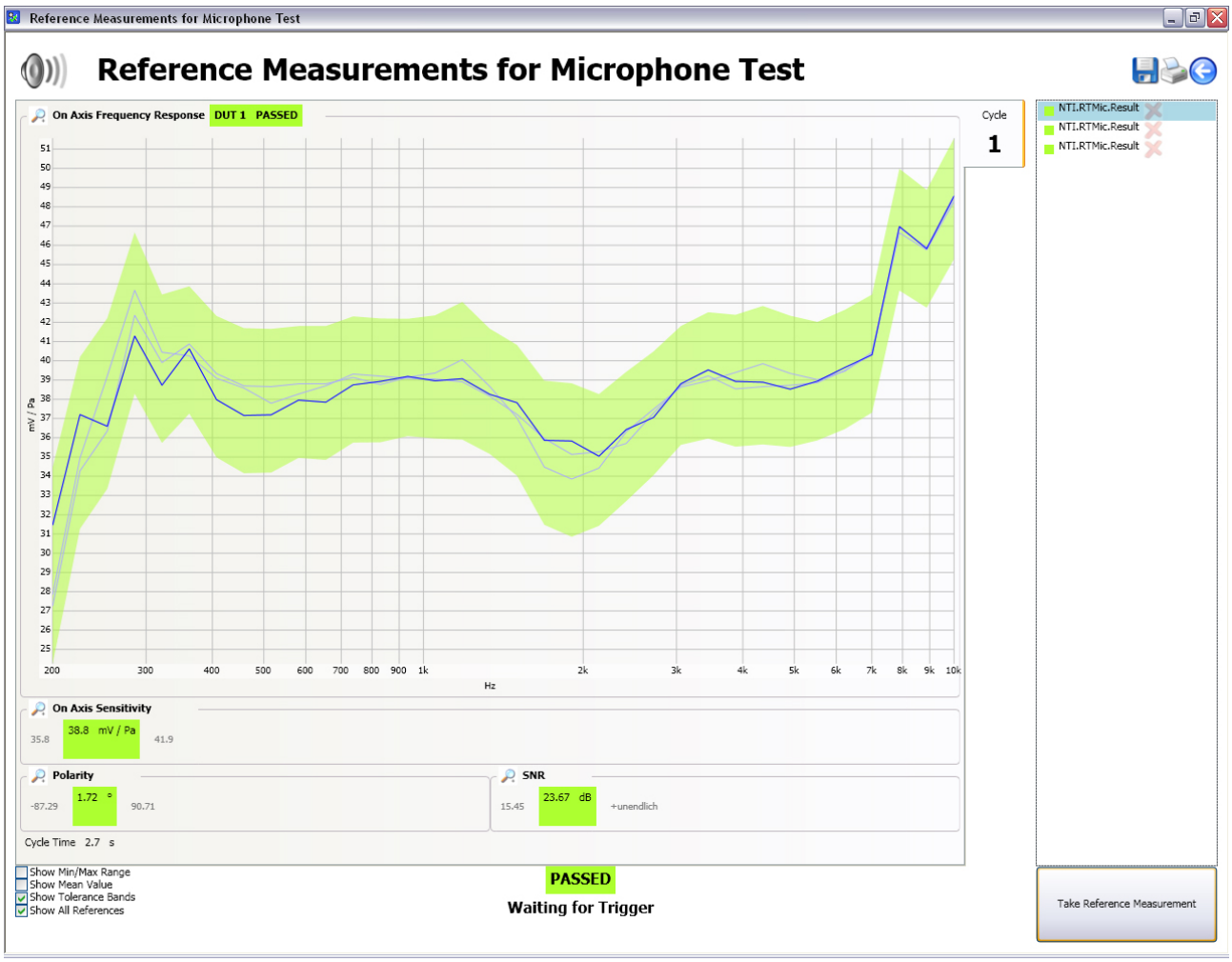


Polar plot measured of cardiod microphone

Calibration and Recording of Reference Data

The automated calibration (e.g. equalization of the reference speaker) is carried out with the measurement microphone M2010. Thereafter the smart "learn-mode" simplifies tolerance definition by feeding the system with a representative set of one or more "Golden Samples". The flexible tolerance management automatically derives its tolerance Pass/Fail criteria. The system also supports up to five different quality clusters, which may be user-defined, such as "Excellent", "OK", "Acceptable", "Class 3" and "Reject". This allows the manufacturer to distinguish between quality classes.

System integration into existing production lines and the connection to host controllers is very simple. The extremely short test cycle time enables the microphone test system to easily cope with high volume production lines.



Screenshot: Recording of reference data

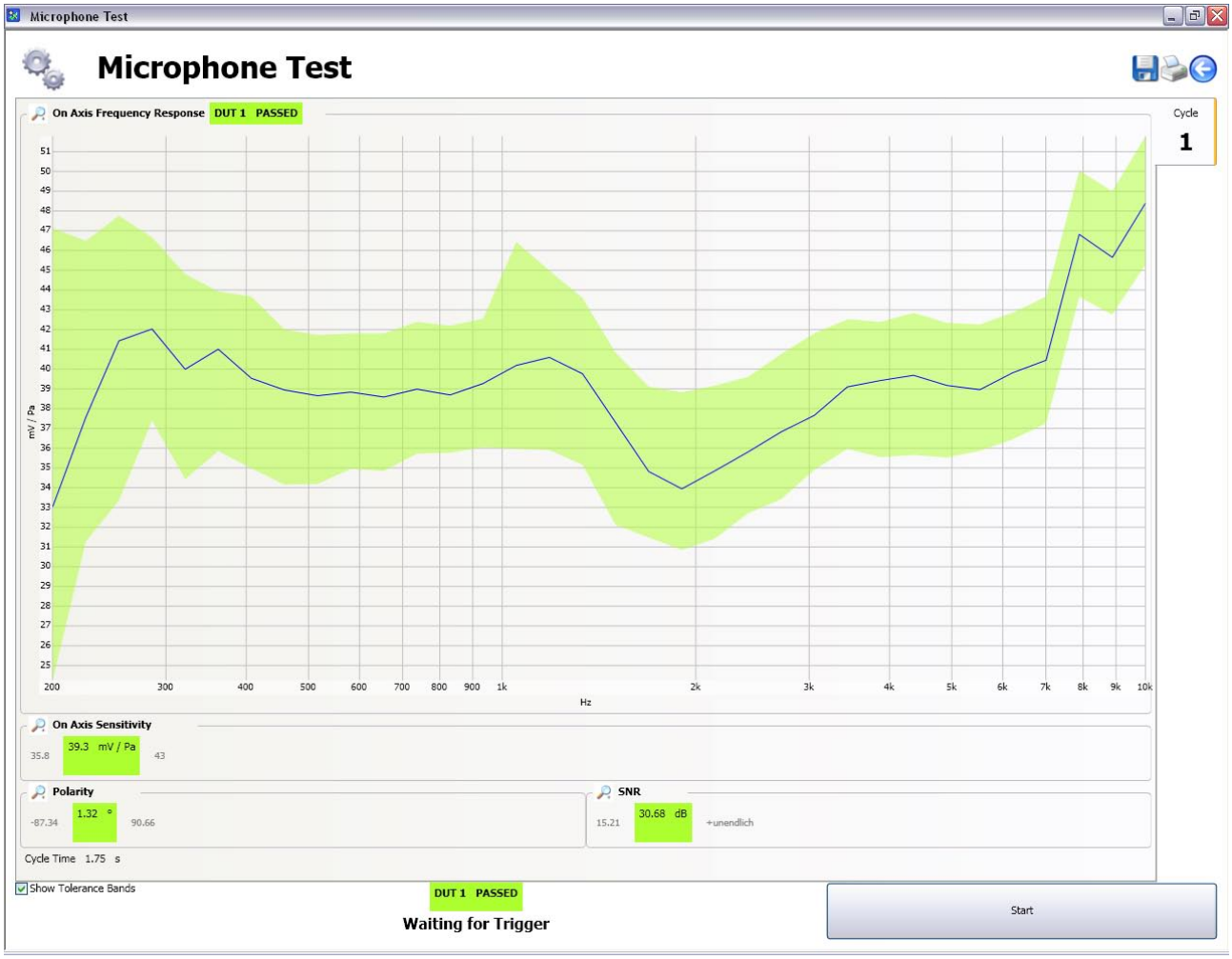
Microphone Test Production Mode

The patented measurement algorithms have been optimized for factory noise immunity. This maximizes production line yield and allows conducting the same measurement in R&D as well as in the production floor. In the production mode the measurement results are compared with the defined tolerances. The individual results of each measured parameter are summarized into a class result. (e.g. Passed/Failed).

The measurement may be triggered by

- Operator, using the keyboard
- Serial number barcode reader
- DIO Input (e.g. PLC trigger signal or foot switch)

The measurement results are shown on the PC-screen, indicated at the digital I/O Output (e.g. driving red/green lamps or bin-sorter) and directly logged into Microsoft Excel xlsx-format.



Screenshot: Production testing result overview

Ordering Information

Basic Configuration:

- FX100 Audio Analyzer
- RT-Microphone Measurement Software
- PureSound Amplifier 150W
- Reference Measurement Microphone M2010, class 1 frequency response, 1/2", SPLmax = 145 dBSPL
- Reference Speaker

Accessories:

- Precision Turntable with microphone holder
- PureSound Rub & Buzz for testing audibe manufacturing imperfections
- 1/2 Cycle PDM Interface for Digital MEMS Microphones
- Input Switcher IS-1002
- Output Switcher OS-0210
- Environmental Sensor
- Sound Calibrator 1/2" class 1, 114dB, 1000 Hz

Automation Accessories:

- GPIB Card, with Cable
- Digital I/O Card, 6503, 6528,
- Digital I/O 6501, USB
- Barcode Reader

Specifications

Analog Generator	
Test Signals	Sine, StepSweep, GlideSweep, White Noise
Level Range	10 µV to 12.45 V (-100 dBV to 21.9 dBV)
Level Accuracy	± 0.05 dB
Level Flatness	< ± 0.01 dB (10 Hz to 20 kHz)
Frequency Range	5 Hz to 80 kHz
THD+N	• -104 dB @ 1 kHz, 0 dBV (typical) • ≤ -101 dB + 1.3 µV (20 Hz to 20 kHz fundamental, Lowpass 22 kHz)
Analog Analyzer	
Measurement Functions	Level (selective & wideband), Frequency, FFT, Gain, THD, THD+N, Harmonics k2-k35, Phase, Crosstalk, Polarity, DC-Level, DC-Impedance, optional: PureSound™ Rub&Buzz
Sweeps	Frequency Sweep, Time Sweep, Level Sweep, Table Sweep
Speed	Frequency response down to 200 ms from 20 Hz to 20 kHz (GlideSweep)
Level Range	<1.0 µV to 141 V (max 200 Vp), channel independent auto ranging
Level Accuracy	± 0.1 dB @ 1 kHz
Level Flatness	< ± 0.02 dB (20 Hz to 20 kHz)
Frequency Range	DC, 5 Hz to 80 kHz
THD+N	• -104 dB @ 1 kHz, 0 dBV (typical) • ≤ -104 dB + 1.5 µV (20 Hz to 20 kHz fundamental, LP 22 kHz)

Residual Noise	≤ 1.5 µV (20 Hz to 20 kHz bandwidth)
Filters	• A-Weighting, C-Weighting, AES17 Brickwall • Highpass 22Hz, Highpass 400Hz, Lowpass 22kHz
Crosstalk	≤ –120 dB + 1 µV to 20 kHz
Input Bias Supply	2 VDC, 48 VDC Phantom Power, ICP®
Input Coupling	AC or DC
General	
Channels	• 2 or 4 Parallel Independent Inputs/Outputs Analog • XLR and BNC connectors
Extension Slots	3 empty slots @ Base Unit FX100 for modular extensions
Interfaces	• USB 2.0 Communication to PC • Headphone connector for audio out, 1/4" Jack Stereo • LAN (prepared for later firmware extension)
Pass/Fail Result	• Built in DIO-Interface controls external peripherals • Dual color display with green/red indication
FX-Control Suite	• PC Software with full access to all audio analyzer features • Parallel measurements with internal/external triggering • Calculation panels for mathematical processing of measurement data • Result reporting: txt-files, csv-files or xlsx-files • Full tolerance handling and hardware wiring diagram
Programming	Supports .NET Assembly (e.g. C#.NET, Visual Basic.NET)
Design	Desktop use or ½ size 19" rack mounting, 3 rack units high

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